XLV. *Obſervation of the Tranſit of* Venus, *and other Aſtronomical Obſervations, made at* Gibraltar; *contained in a Letter to the Aſtronomer Royal from Lieutenant* Jardine.

To regulate the clock.

Read Dec. 7, 1769.

AN equal altitude inſtrument was fixed (nearly ſuch as is deſcribed in Smith's Optics, vol. II. p. 328), on which was mounted a ſmall teleſcope with croſs hairs.

		Sun's upper limb touched the horizontal hair at h	′	″	Sun's lower limb touched the horizontal hair at h	′	″
June 1	Morning	8	32	43	8	35	8
	Afternoon	3	24	33	3	22	0
2	Morning	8	32	20	8	34	46
	Afternoon	3	25	4	3	22	36
4	Morning	8	32	27	8	35	13
	Afternoon	3	25	27	3	22	47
5	Morning	8	32	35	8	35	10
	Afternoon	3	25	53	neglected		

TRANSIT OF VENUS.

By three obſervers, with two 7½ feet refractors, and one 2 feet reflecting teleſcope.

	h	′	″
June 3, Venus's 1ſt external contact with the Sun, at	6	49	58
1ſt internal contact with the Sun, at	7	7	11
Sun ſet behind a hill	7	8	3
Clock before mean time	0	1	8,8

For the LATITUDE of the place.

Obſerved by a Hadley's quadrant, divided into minutes, the double meridian altitudes of Jupiter and Cor Scorpii, reflected from water.

Double meridian altitude of Jupiter.

		°	′	″
May	30	77	6	
June	14	77	50	
	17	77	55	30
	21	78	3	30
By another obſerver,		78	3	0
June	22	78	4	0
	29	78	10	45
July	4	78	14	0

Double meridian altitude of Cor Scorpii.

		°	′	″
June	28	56	7	
	29	56	5	
July	7	56	6	30
	8	56	5	0

Clear weather, in general, during theſe obſervations; and Fahrenheit's thermometer, in the middle of the day, between 75° and 80°
in the night, between 68 and 71

For the LONGITUDE of the place.

			h	′	″	
May	30	Emerſion of Jupiter's firſt ſatellite	12	59	56	
		Clock before mean time	0	1	2	
May	31	Emerſion of Jupiter's 2d ſatellite	10	51	51	
		Clock before mean time	0	1	3½	
June	8	Emerſion of Jupiter's firſt ſatellite	9	22	34	Theſe two are moſt to be depended upon.
		Clock before mean time	0	1	16½	
June	15	Emerſion of Jupiter's firſt ſatellite	11	15	54½	
		Clock before mean time	0	1	28	
June	25	Immerſion of Jupiter's 3d ſatellite	11	59	56	uncertain to perhaps 5 or 6″
		Clock before mean time	0	1	44	
July	8	Emerſion of Jupiter's firſt ſatellite	11	30	57	
		Clock before mean time	0	2	4	

ECLIPSE

ECLIPSE OF THE SUN.

		h	′	″	
June 4	**Firſt contact at**	6	6	54	ſeen perhaps a little too late.
	Laſt contact at	7	19	28	exact.
	Clock before mean time	0	1	9	

		°	′	
Elev. of ☉'s l. limb by Hadley's quad. at	1ſt contact	14	41	both exact.
	2d contact	28	55	

Dip of the horizon, for 160 feet above the level of the ſea, is to be allowed.

SIR,

I Have been diſappointed in the pleaſure I promiſed myſelf, when I ſaw you, of obſerving ſome occultations of fixt ſtars, by the Moon, &c. We ſhall be glad, if theſe obſervations can be of any ſervice. We have endeavoured to diſcover to you the degree of dependance to be placed thereon.

With regard to the clock, we conclude from theſe equal altitudes (correcting for difference of declination, &c.), that, on the 3d of June, it was before mean time 1′ 8″,8. You will eaſily diſcover if there is any error. We afterwards regulated by frequent equal altitudes, by a meridian line on the bottom of a window, and by the ſetting of ſtars behind ſome ſolid buildings.

The latitude appears, from theſe double altitudes, to be ſomewhere between 36° 3′, and 36° 4′; but from more correct declinations, &c. you will be able to determine it more preciſely.

For the eclipſe, we had no micrometer, nor any other method of determining the quantity of it.

To the eye, between $\frac{1}{4}$th or $\frac{1}{5}$th of the Sun's diameter ſeemed to be eclipſed. Though the beginning be rather incorrect, the end may be depended on.

We ſhall be glad if you can determine, from hence, the latitude and longitude of the place, and to know the reſult of the diſcoveries made in our ſyſtem, by the obſervations of the late tranſit, if you will favour us.

I am,

SIR,

Your moſt obedient,

humble ſervant,

Gibraltar, July 14, 1769.

Alexander Jardine.

By re-computing theſe obſervations, I find, that the external contact of Venus happened at $6^h\ 51'\ 8''$, the internal contact at $7^h\ 8'\ 21''$, the beginning of the eclipſe of the Sun at $18^h\ 8'\ 0''$, and the end at $19^h\ 20'\ 33''$, all apparent time; and that the latitude of the place, by the mean of the 4 altitudes of Cor Scorpii, is 36° 4′ 44″, N. The dip of the horizon of the ſea, for an elevation of 160 feet, may be reckoned 12′ 5″.

Nevil Maſkelyne.

XLVI. *Obſer-*